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EXAMINER

BOOSALIS, FANI POLYZOS

ART UNIT	PAPER NUMBER
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2884

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/810,732	BARRY ET AL	
	Examiner	Art Unit	
	Faye Polyzos	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>6/29/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 4, 4, 10-11 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated over admitted prior art.

3. Regarding claim 1, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3).

Regarding claim 4, the admitted prior art discloses the apparatus wherein the collimator (48) is operative to focus light from the optical source (46) through the view port and onto the surface, such that no light from the optical source directly strikes the interior surface of the integrating cavity (42) (See Fig. 15 and Specification, paragraph [005], pages 2-3).

Regarding claim 10, the admitted prior art discloses the apparatus wherein the collimator is disposed within the integrating cavity at an angle from a direction normal to

the surface in the range from about 5 degrees to about 30 degrees (See Fig. 15 and Specification, paragraph [005], pages 2-3).

Regarding claim 11, the admitted prior art discloses the apparatus wherein the collimator is disposed within the integrating cavity at an angle from a direction normal to the surface of about 15 degrees (See Fig. 15 and Specification, paragraph [005], pages 2-3).

Regarding claim 13, the admitted prior art discloses the apparatus wherein any portion of the collimator (48) within the integrating cavity (42) that is in the path of specular reflection from the surface, has a diffuse, reflective surface (See Fig. 15 and Specification, paragraph [005]).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-3 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art as applied to claim 1 above, and further in view of Takeuchi et al (US 5,253,018 A).

Regarding claims 2-3, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate

the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). Takeuchi discloses a toner image density detecting apparatus wherein the optical source is a light emitting diode, emitting infrared light (col. 3, lines 60-66). Takeuchi teaches a wide wavelength range visible light source such as a halogen lamp, tungsten lamp or the like, an a narrow band-width light source such as an LED, semiconductor laser or the like, may be selected in accordance with the spectrum properties of the toner and the photosensitive member (col. 3, lines 60-66). Therefore, it would have been obvious for the prior art to include a light emitting diode as the optical source, as disclosed supra by Takeuchi, to allow for more accurate detection of toner on a surface.

Regarding claim 6, Takeuchi discloses the apparatus wherein the optical detector is a photodiode (col. 3, lines 54-60).

Regarding claim 7, Takeuchi discloses the apparatus wherein the optical detector is a phototransistor (col. 3, lines 54-60).

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art as applied to claim 1 above, and further in view of Genovese et al (US 5,204,538 A).

Regarding claim 5, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate

the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). The admitted prior art does not specifically disclose of a lens disposed in the collimator. Genovese discloses a densitometer wherein the apparatus comprises an lens disposed in the collimator (col. 8, lines 35-40). Genovese teaches primary source (102) generates near infrared light rays which are transmitted through an aperture 118 in housing 120 onto condenser lens (116). Condenser lens (116) collimates the light rays and focuses the light rays onto the marking or toner particles deposited on the test area recorded on the surface of photoreceptor belt (10) (col. 8, lines 35-40). Therefore, it would have been obvious to modify the apparatus disclosed by the admitted prior art, to include a lens disposed in the collimator, as disclosed supra by Genovese, to increase operational efficiencies.

7. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art as applied to claim 1 above, and further in view of Parker et al (US 5,548,120 A).

Regarding claims 8-9, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct

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optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3).

The admitted prior art does not disclose a circuit card. Parker discloses an integrated cavity reflectometer comprising a circuit card (i.e. drive circuit, sensing circuit) disposed proximate to the optical source and detector (col. 8, lines 47-57). Parker teaches the drive circuits are controlled by a set point signal so that the average intensity of the linear light beam emitted from the light integrator exit slit as viewed at the CCD camera is low enough to avoid fogging sensitized film and high enough to efficiently operate the CCD camera. The average light intensity transmitted through the scanned web is detected to provide an intensity feedback signal that is used to control the LED drive circuits to attain the desired average light intensity at the CCD camera (col. 3, lines 55-63). Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art, to include a circuit card, as disclosed supra by Parker, to increase operational efficiencies.

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over *admitted prior art* as applied to claim 1 above, and further in view of *Dalton et al (US 6,004,003 A)*.

Regarding claim 12, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct

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optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3).

The admitted prior art does not disclose of a shroud. Dalton discloses an integrated lighting device including a shroud covering at least part of the collimator, the shroud (114) having a diffuse, reflective surface (See Generally Fig. 3 and col. 4, lines 48-65).

Dalton teaches a the shroud is preferably formed of a translucent material having a partially reflective inner surface for reflecting a portion of incident light emitted from the light source in a forward direction while allowing a portion of the incident light to be transmitted through the shroud and dispersed in peripheral directions. The shroud further preferably includes a diffusing outer surface for diffusing the incident light that is transmitted through the shroud (See Abstract). Therefore, it would have been obvious to modify the apparatus suggested by the admitted prior art, to include a shroud, as disclosed supra by Dalton, to allow for a more robust optical density sensor.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art as applied to claim 1 above, and further in view of Moberg et al (US 5,650,843 A).

Regarding claim 14, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3).

The admitted prior art does not disclose the apparatus comprising a slot. Moberg discloses an integrating cavity including a compensating slot (17) formed therein, the compensating slot operative to allow light reflected from the surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67). Moberg teaches the illuminator system of the type having a light integrating cavity with a light input port, a slot for emitting diffuse integrated light and a feedback port for providing a sample of integrated light from within the cavity, an arc lamp light source for injecting light into the cavity, the arc being subject to motion, and feedback control means including a fiber optic cable optically coupled to the feedback port for controlling the intensity of light into the cavity to maintain stable light intensity within the cavity, the fiber optic cable having a narrow light acceptance angle which intercepts integrated light from a relatively small radiating surface area within the cavity (col. 1, lines 46-67). Therefore, it would have been obvious to modify the apparatus disclosed by the submitted prior art, to include a compensating slot, as disclosed by Moberg, to increase operational efficiencies.

10. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art as applied to claim 1 above, and further in view of Shimada et al (US 5,625,857 A).

Regarding claims 15-17, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity;

and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3).

The admitted prior art does not disclose an intermediate transfer belt surface.

Shimada discloses an optical density sensor for sensing toner on a surface wherein the surface is a media sheet intermediate transfer belt operative to transfer a developed toner image from one or more photoconductive members to a media sheet (See Generally Fig. 1 and col. 2, lines 66-67 and col. 3, lines 1-11, col. 4, lines 59-67 and col. 5, lines 1-3). Shimada teaches in case an intermediate transfer medium is used, a toner concentration of a transferred image greatly changes due to such a change as environment variation of the intermediate transfer medium. So it is effective to measure the toner deposit amount of an image formed on the intermediate transfer medium (col. 2, lines 17-22). Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art, to include a surface wherein the surface is a media sheet transport belt, as disclosed supra by Shimada, to increase operational efficiencies.

11. Claims 18-20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Parker et al (US 5,548,120 A).

Regarding claim 18, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity;

and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). The admitted prior art does not disclose a circuit card. Parker discloses an integrated cavity reflectometer comprising a circuit card (i.e. drive circuit, sensing circuit) disposed proximate to the optical source and detector, the circuit card including at least one of an optical detector sensing circuit (col. 8, lines 47-57). Parker teaches the drive circuits are controlled by a set point signal so that the average intensity of the linear light beam emitted from the light integrator exit slit as viewed at the CCD camera is low enough to avoid fogging sensitized film and high enough to efficiently operate the CCD camera. The average light intensity transmitted through the scanned web is detected to provide an intensity feedback signal that is used to control the LED drive circuits to attain the desired average light intensity at the CCD camera (col. 3, lines 55-63). Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art, to include a circuit card, as disclosed supra by Parker, to increase operational efficiencies.

Regarding claim 19, the admitted prior art discloses the apparatus wherein the optical source (46) is disposed in a collimator (48) (See Figs. 1-4 and col. 1, lines 46-67).

Regarding claim 20, the admitted prior art discloses the apparatus wherein the collimator (48) extends within the interior of the integrating cavity (42) (See Figs. 1-4 and col. 1, lines 46-67).

Regarding claim 22, the admitted prior art discloses the apparatus wherein the collimator (48) is operative to focus light from the optical source (46) through the view

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port and onto the surface, such that no light from the optical source directly strikes the interior surface of the integrating cavity (42) (See Fig. 15 and Specification, paragraph [005], pages 2-3).

12. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Parker et al (US 5,548,120 A) as applied to claim 18 above, and further in view of Genovese et al (US 5,204,538 A).

Regarding claim 21, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). Parker discloses an integrated cavity reflectometer comprising a circuit card (i.e. drive circuit, sensing circuit) disposed proximate to the optical source and detector, the circuit card including at least one of an optical detector sensing circuit (col. 8, lines 47-57). Neither the admitted prior art nor Parker disclose of a lens disposed in the collimator. Genovese discloses a densitometer wherein the apparatus comprises a lens disposed in the collimator (col. 8, lines 35-40). Genovese teaches primary source (102) generates near infrared light rays which are transmitted through an aperture 118 in housing 120 onto condenser lens (116). Condenser lens (116) collimates the light rays and focuses the light rays onto the marking or toner particles deposited on the test

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area recorded on the surface of photoreceptor belt (10) (col. 8, lines 35-40). Therefore, it would have been obvious to modify the apparatus disclosed by the admitted prior art and Parker, to include a lens disposed in the collimator, as disclosed supra by Genovese, to increase operational efficiencies.

13. Claims 23-25 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Parker et al (US 5,548,120 A) as applied to claim 18 above, and further in view of Shimada et al (US 5,625,857 A).

Regarding claims 23-25, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). Parker discloses an integrated cavity reflectometer comprising a circuit card (i.e. drive circuit, sensing circuit) disposed proximate to the optical source and detector, the circuit card including at least one of an optical detector sensing circuit (col. 8, lines 47-57). Neither the admitted prior art nor Parker disclose of an intermediate transfer belt surface. Shimada discloses an optical density sensor for sensing toner on a surface wherein the surface is a media sheet intermediate transfer belt operative to transfer a developed toner image from one or more photoconductive members to a media sheet (See Generally Fig. 1 and col. 2, lines 66-67 and col. 3, lines 1-11, col. 4, lines 59-67

and col. 5, lines 1-3). Shimada teaches in case an intermediate transfer medium is used, a toner concentration of a transferred image greatly changes due to such a change as environment variation of the intermediate transfer medium. So it is effective to measure the toner deposit amount of an image formed on the intermediate transfer medium (col. 2, lines 17-22). Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art and Parker, to include a surface wherein the surface is a media sheet transport belt, as disclosed supra by Shimada, to increase operational efficiencies.

14. Claims 26- 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Moberg et al (US 5,650,843 A).

Regarding claim 26, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). The admitted prior art does not disclose the apparatus comprising a slot. Moberg discloses an integrating cavity including a compensating slot (17) formed therein, the compensating slot operative to allow light reflected from the surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67). Moberg teaches the illuminator system of the type having a light integrating cavity with a light input port, a slot for

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emitting diffuse integrated light and a feedback port for providing a sample of integrated light from within the cavity, an arc lamp light source for injecting light into the cavity, the arc being subject to motion, and feedback control means including a fiber optic cable optically coupled to the feedback port for controlling the intensity of light into the cavity to maintain stable light intensity within the cavity, the fiber optic cable having a narrow light acceptance angle which intercepts integrated light from a relatively small radiating surface area within the cavity (col. 1, lines 46-67). Therefore, it would have been obvious to modify the apparatus disclosed by the submitted prior art, to include a compensating slot, as disclosed by Moberg, to increase operational efficiencies.

Regarding claim 27, the admitted prior art discloses the apparatus wherein the optical source (46) is disposed in a collimator (48) (See Figs. 1-4 and col. 1, lines 46-67).

Regarding claim 28, the admitted prior art discloses the apparatus wherein the collimator (48) extends within the interior of the integrating cavity (42) (See Figs. 1-4 and col. 1, lines 46-67).

Regarding claim 30, the admitted prior art discloses the apparatus wherein the collimator (48) is operative to focus light from the optical source (46) through the view port and onto the surface, such that no light from the optical source directly strikes the interior surface of the integrating cavity (42) (See Fig. 15 and Specification, paragraph [005], pages 2-3).

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15. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Moberg et al (US 5,650,843 A) as applied to claim 26 above, and further in view of Genovese et al (US 5,204,538 A).

Regarding claim 29, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). Moberg discloses an integrating cavity including a compensating slot (17) formed therein, the compensating slot operative to allow light reflected from the surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67). Neither the admitted prior art nor Moberg disclose of a lens disposed in the collimator. Genovese discloses a densitometer wherein the apparatus comprises a lens disposed in the collimator (col. 8, lines 35-40). Genovese teaches primary source (102) generates near infrared light rays which are transmitted through an aperture 118 in housing 120 onto condenser lens (116). Condenser lens (116) collimates the light rays and focuses the light rays onto the marking or toner particles deposited on the test area recorded on the surface of photoreceptor belt (10) (col. 8, lines 35-40). Therefore, it would have been obvious to modify the apparatus disclosed by the admitted prior art and Parker, to

include a lens disposed in the collimator, as disclosed supra by Genovese, to increase operational efficiencies.

16. Claims 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Moberg et al (US 5,650,843 A) as applied to claim 26 above, and further in view of Shimada et al (US 5,625,857 A).

Regarding claims 31-32, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). Moberg discloses an integrating cavity including a compensating slot (17) formed therein, the compensating slot operative to allow light reflected from the surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67). Neither the admitted prior art nor Moberg disclose wherein the surface is an intermediate transfer belt. Shimada discloses an optical density sensor for sensing toner on a surface wherein the surface is a media sheet intermediate transfer belt operative to transfer a developed toner image from one or more photoconductive members to a media sheet (See Generally Fig. 1 and col. 2, lines 66-67 and col. 3, lines 1-11, col. 4, lines 59-67 and col. 5, lines 1-3). Shimada teaches in case an intermediate transfer medium is used, a toner concentration of a transferred image greatly changes due to such a

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change as environment variation of the intermediate transfer medium. So it is effective to measure the toner deposit amount of an image formed on the intermediate transfer medium (col. 2, lines 17-22). Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art, to include a surface wherein the surface is a media sheet transport belt, as disclosed supra by Shimada, to increase operational efficiencies.

17. Claims 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Moberg et al (US 5,650,843 A), as applied to claim 26 above, and further in view of Shimada et al (US 5,625,857 A).

Regarding claim 26, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). Moberg discloses an integrating cavity including a compensating slot (17) formed therein, the compensating slot operative to allow light reflected from the surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67). Neither the admitted prior art nor Moberg disclose of an intermediate transfer belt as the surface. Shimada discloses an optical density sensor for sensing toner on a surface wherein the surface is a media sheet intermediate transfer belt operative to transfer a developed

toner image from one or more photoconductive members to a media sheet (See Generally Fig. 1 and col. 2, lines 66-67 and col. 3, lines 1-11, col. 4, lines 59-67 and col. 5, lines 1-3). Shimada teaches in case an intermediate transfer medium is used, a toner concentration of a transferred image greatly changes due to such a change as environment variation of the intermediate transfer medium. So it is effective to measure the toner deposit amount of an image formed on the intermediate transfer medium (col. 2, lines 17-22). Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art and Parker, to include a surface wherein the surface is a media sheet transport belt, as disclosed supra by Shimada, to increase operational efficiencies.

18. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art, Parker et al (US 5,548,120 A) and Moberg et al (US 5,650,843 A).

Regarding claim 36, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). The admitted prior art does not disclose a circuit card or a compensating slot. Parker discloses an integrated cavity reflectometer comprising a circuit card (i.e. drive circuit, sensing circuit) disposed proximate to the optical source and detector, the circuit card

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including at least one of an optical detector sensing circuit (col. 8, lines 47-57). Parker teaches the drive circuits are controlled by a set point signal so that the average intensity of the linear light beam emitted from the light integrator exit slit as viewed at the CCD camera is low enough to avoid fogging sensitized film and high enough to efficiently operate the CCD camera. The average light intensity transmitted through the scanned web is detected to provide an intensity feedback signal that is used to control the LED drive circuits to attain the desired average light intensity at the CCD camera (col. 3, lines 55-63). Moberg discloses an integrating cavity including a compensating slot (17) formed therein, the compensating slot operative to allow light reflected from the surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67). Moberg teaches the illuminator system of the type having a light integrating cavity with a light input port, a slot for emitting diffuse integrated light and a feedback port for providing a sample of integrated light from within the cavity, an arc lamp light source for injecting light into the cavity, the arc being subject to motion, and feedback control means including a fiber optic cable optically coupled to the feedback port for controlling the intensity of light into the cavity to maintain stable light intensity within the cavity, the fiber optic cable having a narrow light acceptance angle which intercepts integrated light from a relatively small radiating surface area within the cavity (col. 1, lines 46-67). Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art, to include a circuit card and a compensating slot, as disclosed supra by Parker and Moberg, to increase operational efficiencies.

19. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art, Parker et al (US 5,548,120 A) and Moberg et al (US 5,650,843 A) as applied to claim 26 above, and further in view of Genovese et al (US 5,204,538 A).

Regarding claim 37, the admitted prior art discloses an optical density sensing toner on a surface in an image forming device, comprising: an integrating cavity (42) having a diffuse, reflective inner surface (44) and having a view point (50) formed therein; an optical source (46) disposed in a collimator (48) and positioned to illuminate the surface through the view point, the collimator extending into the integrating cavity; and an optical detector (54) disposed within the integrating cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). The admitted prior art does not disclose a circuit card or a compensating slot. Parker discloses an integrated cavity reflectometer comprising a circuit card (i.e. drive circuit, sensing circuit) disposed proximate to the optical source and detector, the circuit card including at least one of an optical detector sensing circuit (col. 8, lines 47-57). Parker teaches the drive circuits are controlled by a set point signal so that the average intensity of the linear light beam emitted from the light integrator exit slit as viewed at the CCD camera is low enough to avoid fogging sensitized film and high enough to efficiently operate the CCD camera. The average light intensity transmitted through the scanned web is detected to provide an intensity feedback signal that is used to control the LED drive circuits to attain the desired average light intensity at the CCD camera (col. 3, lines 55-63). Moberg discloses an integrating cavity including a compensating slot (17) formed therein, the compensating slot operative to allow light reflected from the

surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67). The admitted prior art, nor Parker nor Moberg disclose of a lens disposed in the collimator. Genovese discloses a densitometer wherein the apparatus comprises a lens disposed in the collimator (col. 8, lines 35-40). Genovese teaches primary source (102) generates near infrared light rays which are transmitted through an aperture 118 in housing 120 onto condenser lens (116). Condenser lens (116) collimates the light rays and focuses the light rays onto the marking or toner particles deposited on the test area recorded on the surface of photoreceptor belt (10) (col. 8, lines 35-40). Therefore, it would have been obvious to modify the apparatus disclosed by the admitted prior art, Parker and Moberg, to include a lens disposed in the collimator, as disclosed supra by Genovese, to increase operational efficiencies.

20. Claims 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Moberg et al (US 5,650,843 A).

Regarding claim 38, the admitted prior art discloses a method of sensing toner on a surface in an image forming device, comprising: illuminating the surface with an optical source (46); capturing light reflected from the source by the surface in an integrating cavity (42) having diffuse, reflective inner surface (44), the reflected light passing through a view port (50) formed in the cavity; sensing light reflected from the inner surface of the cavity onto an optical detector (54) disposed within the cavity outside of a direct optical path of the source (See Fig. 15 and Specification, paragraph [005], pages 2-3). The admitted prior art does not disclose of light passing through a compensating slot. Moberg discloses an integrating cavity including a compensating

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slot (17) formed therein, the compensating slot operative to allow light reflected from the surface to directly strike the optical detector (See Figs. 1-4 and col. 1, lines 46-67).

Moberg teaches the illuminator system of the type having a light integrating cavity with a light input port, a slot for emitting diffuse integrated light and a feedback port for providing a sample of integrated light from within the cavity, an arc lamp light source for injecting light into the cavity, the arc being subject to motion, and feedback control means including a fiber optic cable optically coupled to the feedback port for controlling the intensity of light into the cavity to maintain stable light intensity within the cavity, the fiber optic cable having a narrow light acceptance angle which intercepts integrated light from a relatively small radiating surface area within the cavity (col. 1, lines 46-67).

Therefore, it would have been obvious to modify the apparatus disclosed in the admitted prior art, to include a compensating slot, as disclosed supra by Moberg, to increase operational efficiencies.

Regarding claim 39, Moberg discloses the amount of light reflected by the surface directly striking the optical detector is directly proportional to the distance of the cavity from the slot (See Figs. 1-4 and col. 1, lines 46-67).

Regarding claim 40, the admitted prior art discloses a method wherein the light reflected from the source (46) by the surface (44) that directly strikes the detector (54) compensates for the attenuation in light reflected from the inner surface of the cavity (42) onto the optical detector (54) due to the distance of the cavity from the surface (See Fig. 15 and Specification, paragraph [005], pages 2-3).

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Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

23. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP


OTILIA GABOR
PRIMARY EXAMINER